REMARKS

This Response is being filed in response to the Office Action dated July 7, 2003. Claims 1-12 are currently pending in the application. Of these, claim 1 is independent. Claims 1-12 stand rejected in the outstanding Office Action. No amendments have been made herein and therefore new matter has been added. Favorable reconsideration of the application is respectfully requested in light of the following remarks.

Prior to addressing the rejections set forth in the Office Action, Applicants take this opportunity to set forth the following brief remarks in connection with the invention, which relates to a magnetic recording medium having excellent error-rate (ER) characteristic and still durability that is suitable to record and playback digital signals, and is especially suitable as magnetic tape. As discussed in the specification, there has been a growing trend to record and reproduce pictures and music in digital form. It is common in the art to smoothen the tape surface, make a highly packed magnetic layer, increase output by heightening coercive force (Hc), or to elevate CNR in order to improve the tape-originated error rate, which is used to evaluate tape performance. However, the error rate cannot be reduced merely by increasing output. For example, it has been determined that a deterioration in error rate can be caused at frequencies higher than 20 MHz because of degradation in wave-form responsivity.

The invention provides a magnetic recording medium adaptable for digital recording and playback having low error rate and high still durability, especially when applied to a record reproduction apparatus operating at frequencies of 10 MHz of above. By providing a magnetic recording medium having a lower nonmagnetic layer and a magnetic layer comprising a ferromagnetic powder and a urethane resin binder having a glass transition temperature Tg of 70°C or higher, wherein the magnetic layer has a coercive force (Hc) of 2,500 to 3,500 Oe and a

squareness ratio (SQ) of 0.70 to 0.85 in a length direction, the present invention provides reduction in error rate while ensuring high output. This combination of ranges has unexpectedly been found to be preferable because the Hc range of 2500-3500 Oe (197.5-276.5 kA/m) secures a short wavelength output and prevents head saturation, the SQ range of 0.70-0.85 secures high output level, reduces ER and improve still durability, and the Tg range of 70°C or improves still durability.

Whereas each range provides a benefit, the resulting benefits of the specified combination of ranges is unexpectedly substantially superior to the sum of the individual benefits. Accordingly, the objective of the invention, namely a Bit Error Rate (BER) of $1x10^{-5}$ or less and a still durability of 60 minutes or more can only be obtained if every element of the invention is met.

Rejection of Claims Under 35 U.S.C. §103(a)

Claims 1-12 were rejected in the July 7, 2003 Office Action under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,017,605 to Yamazaki et al. (Yamazaki) in view of U.S. Patent No. 6,074,724 to Inaba et al. (Inaba). Applicants respectfully submit that Yamazaki in view of Inaba fails to teach, suggest or render obvious each of the limitations of claims 1-12.

In the Office Action, the Examiner states that Yamazaki discloses a magnetic recording medium comprising a nonmagnetic lower layer and a urethane resin binder containing magnetic layer, wherein the magnetic layer has a coercive force of 1,500 to 5,000 Oe, a squareness ratio of 0.7 to 0.8 in the machine direction. According to the Examiner, Yamazaki discloses every element of the invention except the glass transition temperature Tg of the urethane resin. The Examiner further states that Inaba suggests a urethane resin having a Tg of at least 80°C as the binder for the magnetic layer. The Examiner states that it would therefore

have been obvious to one having ordinary skill in the art to utilize the urethane resin having a Tg of at least 80°C as taught by Inaba in the magnetic layer of Yamazaki because Inaba states that urethane resin with specific Tg provides sufficient running and storage durability. Applicants respectfully traverse this rejection.

Applicants respectfully assert that not only do Yamazaki and Inaba fail to teach the invention, they are fundamentally different from and teach away from the invention. First, Yamazaki is directed to improving the ER at high density regions, and does not address simultaneously achieving a low ER and good still durability. Yamazaki discloses an Hc of 2000 Oe or more, an SQ of 0.70 or higher, and a urethane resin having a Tg within range –50 to 150°C. As described in paragraph 11 of the specification as filed, the invention requires an Hc of greater than 2500 Oe but less than 4000 Oe, preferably from 2,500 to 3,500 Oe. "When Hc is lower than 2,500 oersted (197.5 kA/m), the output at short wavelengths cannot be secured; while when Hc is higher than 4,000 oersted (316 kA/m) saturation of a head used for recording is caused to disable the attainment of high output." Therefore, because Yamazaki describes an Hc range of 2000 Oe or higher, it teaches a range that encompasses Hc's that would result in head saturation or prevents securing short wavelengths, which would frustrate the objectives of the invention. Therefore Yamazaki teaches away from the invention and does not render obvious or suggest the combination of ranges specified by the invention.

Furthermore, Yamazaki is directed to "tape durability" and not "still durability". Tape durability is measured by the output deterioration when the tape has been driven to run for a long period of time. This is in contrast to "still durability" of the invention, which is evaluated by sliding a fixed area of the tape with a head. Therefore an increase in tape durability does not necessarily result in an increase in still durability, and it is not possible to evaluate still durability simply by measuring tape durability. The purposes and objectives of Yamazaki are different

from that of the invention and therefore Yamazaki is fundamentally different from the invention and does not teach or suggest the invention.

Inaba is also fundamentally different from the invention. Inaba is directed to achieving excellent long time storage stability, running durability, coating strength under elevated temperature conditions and electromagnetic conversion property. Inaba discloses an Hc of 1650-3000 Oe and a urethane resin having a Tg preferably from 80-150°C. As stated above, because an Hc outside the range 2500-3500 specified in the invention makes the objective of the invention unattainable, Inaba teaches away from the invention by including values of Hc that fall outside of the 2500-3500 range.

Similar to Yamazaki, "still durability" evaluated in the invention is not discussed by Inaba. Instead, Inaba discusses "running durability", which is the sliding characteristic between a guide and a tape during VTR driving, and is different from "still durability" of the invention, which is the sliding characteristic between the VTR head and tape. Inaba evaluates running durability by measuring the change in output of a tape having a length of 10-minute recording that had undergone 500-pass running at 23°C. The change in output is measured by calculating the increase in the number of drop outs over the initial running. Inaba alternatively evaluates the sliding characteristic by measuring the friction coefficient μ after a stainless steel bar has been driven to run 100 times on the same area of the tape at a sliding speed of 14 mm/sec. In contrast, still durability of the invention is evaluated by measuring the time until RF output disappears when the medium is inserted in a DVCpro drive and slid at 9000 rpm (relative speed of 10 m/sec). The property of the medium being measured by the different durabilities and the process performed in evaluating them differ greatly and make evident that the durabilities themselves also differ greatly. Therefore the objectives of Inaba differ from that of the invention and it would not have been obvious to someone of ordinary skill to create the

combination of ranges specified in the invention to obtain simultaneous low ER and good still durability.

Furthermore, as established by the comparative data set forth in the specification, the invention provides unexpected benefits compared to Yamazaki or Inaba. As illustrated in Tables 2, 3 and 6, if any element of the invention is lacking, the simultaneous low ER (or BER) and good still durability is not obtained. Referring to Table 1, Comparative Examples 1-4 comprise Hc and Tg that comply with the requirements of the invention but an SQ that does not.

The standard for satisfactory BER is $1x10^{-5}$ or below and satisfactory still durability is 60 minutes or longer. According to the results presented in Table 1, Example 1, which fulfilled all the elements of the invention with an Hc of 2610 Oe, an SQ of 0.84 and Tg of 90°C, had a BER of $2x10^{-5}$ and still durability of 110 minutes. Comparative Example 1, for which the Hc was 2840 Oe and Tg was 90°C, fulfilling two of the requirements of the invention, had an SQ of 0.87, which was the only element of the invention that was not met. Comparative Examples 2-4 likewise fulfilled the Hc and Tg requirements but did not meet the SQ requirement of the invention.

On the other hand, when the range specified in the claims are met, the objective described in the specification can be met. Example 1 resulted in a satisfactory BER and still durability as stated above, the BER of Comparative Examples 1-4 did not fall below $7x10^{-4}$ and the still durability did not reach 60 minutes. Accordingly, the data shows that the SQ range 0.70-0.85 specified by the claims was necessary to obtain the desirable ER and still durability.

However, SQ is not the determining factor. In Table 3, Comparative Example 5, which met the SQ and Tg requirements of the invention but not the Hc requirement, with an Hc of 2450 Oe was unable to obtain satisfactory BER, and resulted in a BER of $8x10^{-4}$.

Similarly, Table 6 illustrates the results when the Tg element of the claims is not present. Comparative Example 8 had an Hc of 2500 and an SQ of 0.85, both of which are according to the requirements of the invention. The Tg, however, was 64°C, instead of the required "70°C or higher". The resulting BER was $2x10^{-4}$ and still durability was 44 minutes, neither of which is satisfactory.

It is also notable that Comparative Example 8 is in accordance with Yamazaki, which discloses an Hc of 2000 or greater, an SQ of 0.70 or greater, and a Tg of 50-150°C. The fact that a medium consistent with the teachings of Yamazaki fails to meet the objectives of the invention supports Applicants' assertion that Yamazaki is fundamentally different from the invention and does not render it obvious. Had the missing features been obvious, Yamazaki would have used them to achieve applicants' unexpected benefits. This is further supported by the fact that Comparative Examples 1-4 discussed above all conform to the teachings of Inaba. Neither Yamazaki nor Inaba teaches the invention, and as discussed above, taking a sum of the parts would still not result in the benefits attained by the invention. Additionally, because the objectives of Yamazaki and Inaba are different from that of the invention, there is no suggestion to combine and modify the teachings of Yamazaki and Inaba to create the invention especially in order to obtain the benefits made possible by the invention.

The individual values of Hc, SQ and Tg do not add individual benefits to reach the benefits obtained by the invention. Rather, the combination of the required ranges creates the desired result, and as shown by Tables 2, 3 and 6, only if every element of the invention is met.

Applicants respectfully maintain that Yamazaki in view of Inaba fails to render claim 1 obvious. Claims 2-12 depend from claim 1, and because independent claim 1 is not rendered obvious by Yamazaki and Inaba, dependent claims 2-12 are also not rendered obvious

by Yamazaki and Inaba. Accordingly, Applicants respectfully submit that claims 1-12 are in condition for allowance.

No fee other than the petition for extension of time is deemed necessary in connection with the filing of this Response. However, if any fee is required, the Examiner is hereby authorized to charge the amount of such fee to Deposit Account No. 19-4709.

Respectfully submitted,

Lawrence Rosenthal #32,994
Registration No. 24,377
Attorney for Applicants
STROOCK & STROOCK & LAVAN, LLP
180 Maiden Lane
New York, New York 10038-4982
(212) 806-5400